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SOME NOTES ON ZONITIDAE.

BY DR. V. STERKI.

1. The generic name *Zonites* Montf., has, by European malacologists, long ago been restricted to a group of circum-Mediterranean forms, such as *algirus*, *verticillus*, *gemonensis*, etc., none of them being represented in the recent North American fauna; and as it seems to be a well-defined genus, we will do well to recognize this restriction of the group. The old genus *Zonites*, or *Hyalinia*, is being disintegrated, just as the old genus *Helix* has been. For *nitidus* Müller, the genus *Zonitoides* has been established on characters chiefly anatomic, the presence of a dart sac and dart, and, as it seems, peculiarities of the radula. As the same dart sac and dart is present in a number of North American species, such as *elliotti*, *ligerus*, *demissus*, *intertextus*, *gularis*, *suppressus*, *internus*, etc., and, as has been supposed, and I can positively confirm, *arboreus*—they would range under *Zonitoides*, especially if their anatomy prove to agree with *nitida*, also otherwise. Dr. v. Ihering makes the proposition to unite all Vitrinino-zonitidae having a dart¹ in a family, as xiphogone forms—“Zon.” (or Hyal.) *fulvus* Müll., *gundlachi* Pfr., *sterkii* Dall., belong to the genus *Conulus* Fitz., well characterized anatomically. *Hy. crystallina* Müll., *diaphana* Studer., etc., of the old continent, have their peculiar anatomy also, and range under

¹ Which, however, is not homologous with the dart of the Helicidae, and therefore named *pugio*, by v. Ihering.

the genus *Vitrea* Fitz. On the other hand, as well known, our *Mesomphix* (s. str.) are hardly to be separated generically from *Hyalinia* (*Euhyalinia*), as *glabra*, *draparnaldi*, *cellaria*, etc., and forms like our *wheatleyi*, *petrophila* from *pura*, etc., not to speak of *radiatula* which is equally distributed on the old and new continents. We may, for all these, use the generic name *Hyalinia*, the more since such authorities as W. G. Binney, Tryon and others have done so before, and no embarrassing of the synonymy will result. Yet all these forms still need careful examination as to their anatomy.

2. Some *Zon. suppressus* Say, show not a trace of internal teeth or rather lamellæ, when adult; W. G. Binney (l. c. p. 226) also says that the tooth is sometimes "so little prominent as to be hardly visible." I have in possession specimens from Ohio and Virginia (Petersburgh, collected by myself)¹ of 7-8 mill. diam. and 7-7½ whorls, with the last whorl and aperture well-rounded, without any "teeth," and only a thin callus inside. As to size and shape, they differ essentially from W. G. Binney's description and figure.² With these, there were examples of all ages and sizes, inseparately connected with the former, having two strong lamellæ upon a heavy callus. Also in *gularis* and other forms of the group, the lamellæ considerably decrease in size and number with advancing age, and at maturity sometimes are quite short and thin.

3. Mrs. Geo. Andrews, to whom we owe so many valuable finds among land mollusca, sent me, in 1891, a number of "*Zonites gularis* small var." Then I was satisfied that they were not *gularis*; and now, after repeated comparison and examination also of the soft parts on specimens recently obtained, this is beyond a doubt, and as well, that it is a distinct species, not yet described. Here only so much of the description will be given as to serve our purpose. The shell is of the general appearance of a small *Z. ligerus*, of only 9 mill. greater diameter, finely perforated, with a high spire, well-rounded at the apex. Inside there is a rather long fold corresponding to the same (outer) in *Z. gularis*, etc., and a lower one near the columella. In a part of the specimens there is another (outer) long fold, about ½-¾ volution above the aperture, sometimes connected by a fine marking with the one in front; evidently this is the one previously formed and not resorbed, the same thing as in *Z. internus*, etc.

4. A few examples of *Zonites*, I think a form of *demissus*, from

² Manual, p. 225; fig. 241, looks like drawn from an immature specimen.

Nashville, Tennessee, and Jackson Co., Alabama, the latter collected by Mr. Sargent, have a strong, thick, white, testaceous deposit inside the base of the last whorl, with some nodules, apparently irregular, but equal in the specimens from either locality, which correspond to teeth or folds. These testaceous deposits in different species are often smaller and thinner in mature shells than in adolescent, and sometimes entirely resorbed; they evidently are the same morphological element as the deposits and folds in *Gastrodonta*.

5. I believe the fact must impress itself upon anyone that *Zon. suppressus*, especially the form noted above; *gularis*, also more in some forms, much resemble *Z. ligerus*, *demissus*, etc., and are nearly related to them, much more so than the latter are to the *Mesomphix* between which they are inserted in systematic works. This feeling found its expression also in W. G. Binney's "L. & F. W. Shells," where *ligera*, *demissa*, *intertexta* are ranged under the genus *Hyalinia*, the *Mesomphix* under *Zonites*. To this now comes the species announced under 3 above, resembling *ligera* as to the general configuration of the shell, and "*Gastrodonta*" in the lamellæ, which are of a somewhat peculiar type at that, approaching it to *significans* Bld. Some light on the significance of presence or absence of internal teeth is given also by *Conulus fulvus*, in which, as we have seen, such may be found or wanting in the same form from the same locality. And a character common to the two groups, valuable even of higher order, seems to be the presence of a dart, in the genital organs, which would range them together in the genus *Zonitoides*. It may be communicated here, previously, that I have found, in the upper part of the penis in *Z. ligerus*, *suppressus*, the forms mentioned under 3 above, and in *arboreus* a peculiar papilla (Reizkörper of German authors) in which a part is hard, sharp, projecting and (in the 3 former species) impregnated with carbonate of lime.

6. Quite lately, Mrs. Andrews has sent me specimens of a *Zonites*, collected at Cranberry, Mitchell Co., North Carolina. They can be referred to none of the described species, and may prove to be a new one.³ The shell, of about 7 m. in diam., has two very small lamellæ or teeth near the aperture, corresponding to the same *Z.*

³ The n. sp., however, may be "hanged in the smoke till cured," or left in suspense till fully confirmed; it is, *as such*, of little consequence, but of great importance as a form.

gularis, and thus proves to be a *Gastrodonta*. The shell is thin, transparent, somewhat greenish deep horn colored, of the same appearance as *Z. nitidus* Müll., which species it surprisingly resembles below, while above it appears different by the greater number of whorls. It seems that here we have a "missing" or connecting link between the so-called type of *Zonitoides*, and its more characteristic North American members.

7. Mrs. Andrews has, of late, again sent me numerous small *Zonitidae*, collected in the mountains of Tennessee and North Carolina. From these I learned, beside other things, that *Zon. andrewsi* W. G. B., when adult, has very often (or always?) no internal teeth at all. Moreover, the shell attains quite a different configuration: the last whorl is placed considerably deeper on the penultimate, or gradually descends, thus causing the spire to be much more elevated; it becomes also deeper and at last somewhat truncate in the periphery (perpendicular section) and subangular below, comparatively large, just as we find it in some *ligerus*, *gularis*, *suppressus*. At the same time, the base is no more equally rounded, but becomes sloping inward, somewhat infundibuliform, the umbilicus is rather large, and the striation becomes more crowded and coarse, even so that the striae appear to be raised (*i. e.* the intervals) in place of impressed, as they are on the inner whorls. The whole shell then has quite a different appearance from that commonly known as *Z. andrewsi*, much resembling the description and figure of *Zon. placentulus* Shuttl. (in W. G. Binney's Manual, p. 222). The whorls are fully 9 or more, the diameter 7-7.5 mill. It was somewhat difficult to state these relations, as I had, though, a good number of specimens, no complete series from one locality at disposition. There is no doubt, to say no more, that many such examples have been taken for *Zon. placentulus*. And, as a striking proof of this, I have in my collection four specimens from the mountains of North Carolina received as *Zon. placentulus*, years ago, from a conchologist who studied those land shells; they show more or less the characteristic features noted above, and one of them has a distinct row of denticles denoting it unmistakably as *Zon. andrewsi*.

8. As with the preceding, it is with *Zon. significans* Bld. Only the younger examples, *i. e.*, those commonly found in collections under this name, have the teeth, two series of two, as a rule. In older specimens, of 5-6 mill. diam., they are no more formed, or only occasionally one or another, and then the shells have the characters

of *capsella* Gld., and doubtless have been and will be taken for such. A lot of fine examples, received from the same author, collected in eastern Tennessee, and named *capsella*, are, to all probability, nothing else but adult significans, in which the last whorl becomes comparatively more voluminous and commonly more descending. The spire is variable from almost flat to rather elevated, and also the umbilicus shows some differences. Among lots, which to all appearance, were *Zon. capsellus*, there were examples with a single, sometimes barely perceptible, tooth.

9. With all this, I do not feel positive, at present, that *Zon. andrewsi* W. G. B., and *significans* Bld., are only the juvenile forms of *Zon. placentulus* Shuttl. and *capsellus* Gld. But so much is sure, that they must be desperately similar, respectively, and that they need careful revision, also as to anatomy. The words of W. G. Binney that the latter form "a puzzling group," become of an increased meaning now.

10. For faunistics, it may be of interest that there were a few specimens of *Hyal. ferrea* Mse., from eastern North Carolina, among the materials sent by Mrs. Andrews. In my collection there is one from Randolph Co., West Virginia. Also from different places in eastern Ohio it is known.

New Philadelphia, Ohio, May, 1893.

A REVIEW OF VON IHERING'S CLASSIFICATION OF THE UNIONIDÆ AND MUTEIDÆ.

BY CHAS. T. SIMPSON.

Since the theory of evolution has been generally accepted, a complete revolution has taken place in the methods of study and classification among biologists. All artificial systems, or those based upon a single character, have either been relegated to the past or are hopelessly doomed. Students who are progressive and keep abreast of the times, realize that in the study of organic life it is necessary to seize on to every fact which can possibly aid them in classifying: embryology, anatomy, the study of its development in the past as taught by palaeontology, geographical distribution and habits.

Dr. H. von Ihering, of Rio Grande do Sul, Brazil, has recently